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BasicS, an Euphresco International Network on Renewable Natural Substances for Durable Crop Protection Products

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Abstract

Under the European Union aegis, a new round of non-competitive projects is being initiated via Euphresco. The topic description developed within the consortium created within Euphresco research coordination is the development of the basic substance for management of pests/vectors via natural compounds. Basic substances are approved for use in the European Union and are products which are already sold for certain purposes, e.g., as a foodstuff or a cosmetic, but which can also serve as plant protection products. A list of 23 basic substances approved is available through the EU Pesticides database. These substances are mostly biorationals (medicinal plant extracts like *Equisetum*, *Urtica*, *Salix* and Mustard seeds powder), products used in human medicine (chitosan, calcium hydroxide), food compounds (milk, whey, vinegar, beer, fructose, sucrose, lecithin, vegetable oils, bicarbonate, sodium

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chloride and onion) or common substances (talc, amino acids, diammonium phosphate, clay and charcoal) but used as means of plant protection. The project aims to test and validate the use of basic substances as plant protection measures. All partners have

experience in the application of basic substances and potential basic substances in the field or postharvest, in their mechanisms of action, in their chemical characterization or in their approval process.

1. Introduction

With the aim to enhance international collaboration on plant health research, the Euphresco network (Euphresco, 2021a) for phytosanitary research coordination and funding organize every year a call to identify internationally shared research priorities of interest for research funders, policy makers and research organizations. One of the topics proposed in 2020 focusses on basic substances as an environmentally friendly alternative to synthetic pesticides for plant protection. Human and environmental health risks associated with the use of synthetic pesticides are a growing concern. The recent Farm to Fork strategy of European Green Deal set an ambitious goal to reduce by 50% of the use of pesticides by 2030. The emergence of resistance and the withdrawal and restrictions to use of pesticides (Directive 91/414/EEC of July 1993 and Regulation 1107/2009/EC), on a European Union level (EC, 2009; EU, 2011) but also on a worldwide scale, are encouraging a reduction to use pesticides (EC, 2009) and the adoption of alternative control methods and integrated pest management (IPM) approaches (Marchand, 2017a, Robin and Marchand, 2019a, Matyjaszczyk, 2019). Commonly available basic substances have been assessed as acceptable for specific plant protection purposes, especially in biocontrol protection (Robin and Marchand, 2019b) and organic production (Marchand, 2017b; EU, 2021b) in Annex I point 1.

2. The Project

The opportunity to use natural crop protection methods in agriculture is linked to the capacity to perform an increase number of trials drastically in order to identify new basic substances (Marchand, 2015, 2017c) or extend the uses of existing ones (Robin and Marchand, 2019c). The Euphresco project (Euphresco, 2021b) will demonstrate the use of basic substances to manage postharvest diseases of fresh fruits, vegetables and aromatic plants and to the management of seedborne pathogens on several crops (cereals, vegetables, etc.), for which there is a reduced number of effective synthetic pesticides available. Currently, 23 basic substances are approved (EU, 2021a) and usages details are available through the EU Pesticide

database under the corresponding Review Reports. These substances, allowed for the all European Union Member States after approval, are substances with no concern like chitosan (Romanazzi et al., 2002, 2006, 2013), food compounds (Marchand, 2016) or common mineral substances now with usages as plant protection products with no associated Maximum Residue Limits (MRL) (Charon et al., 2019). The project aims (Euphresco, 2021c) to test in field and greenhouses, but also to validate the use of these approved basic substances as part of plant protection tools in EU and also for importers to EU. The project gathers 30 research organizations from 16 countries worldwide: Australia, Brazil, China, Cyprus, Colombia, Czech Republic, Egypt, France, Hungary, Iran, Italy, Mexico, Poland, Spain, Tunisia and Turkey. All project partners have experience in the application of basic substances and potential basic substances in the field or preharvest and postharvest, and/or in their mechanisms of action, and/or in their chemical characterization and/or in their approval process (Euphresco, 2021d). Among partners, the Technical Institute for Organic Agriculture (ITAB, France) is the leader for the inclusion of these basic substances in Europe, with 18 basic substances managed (out of 23) at general regulation and many transfers in organic production for crop protection, and the Marche Polytechnic University (UNIVPM, Italy) will be the coordinator of all trials in the field and greenhouses, and responsible for the validation of the use of chitosan as plant strengthener/elicitor (Romanazzi et al., 2017, Rajestary et al., 2021).

3. Results Expected

- A final report on the global performance of each method assessed through the collaborative test's performance study,
- Review of the current knowledge on applications of potential basic substances in preharvest disease and pest management,
- Review of the current knowledge on applications of potential basic substances in postharvest disease and pest management,
- Report on the application of basic substances and potential basic substances to manage diseases and pests in the field,

- Report on the efficacy of the treatments with potential basic substances,
- Report on the detection of the main seedborne pathogen and pest of vegetables,
- Report on seed treatment using essential oils and chitosan,
- Report on seed treatments using the mixture of essential oils and chitosan,
- A publication and/or presentation during an international congress on the test performance study.

4. Conclusion

For two years, the **BasicS** Consortium will investigate the extension of uses of existing basic substances currently used in order to further validate them, basic substances pending approvals and potential or deposited basic substances in order to generate data to register them. The project results will provide scientific evidence to support the work of the policy makers (*de novo* approval or extension of uses) in order to accelerate the adoption of basic substances in the field and convert into uses with legal frame through *de novo* approval or extension of uses (new Draft Review Report).

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6. References

- Charon, M., Robin, D., Marchand, P.A., 2019. The importance of substances without maximum residue limit (MRL) in integrated pest management (IPM). *Biotechnologie, Agronomie, Société et Environnement* 23(1), 22-29.
- EC, 2009. Commission Regulation (EC) No 1107/2009 of the European Parliament and of the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC. *Official Journal of the European Union* L 309, 1-50
- EU, 2011. Commission Implementing Regulation (EU) No 540/2011 of 25 May 2011 implementing Regulation (EC) No 1107/2009 of the European Parliament and of the Council as regards the list of approved active substances. *Official Journal of the European Union* L 153, 1-186.
- EU, 2021a. EU Pesticides Database (v.2.2). Available from https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/active-substances/index.cfm?event=search.as&t=1&a_from=&a_to=&e_from=&e_to=&additionalfilter__class_p1=&additionalfilter__class_p2=&string_tox_1=&string_tox_1=&string_tox_2=&string_tox_2=&string_tox_3=&string_tox_3=&string_tox_4=&string_tox_4= Accessed on August 2021.
- EU, 2021b. Commission Implementing Regulation (EU) 2021/1165 of 15 July 2021 authorising certain products and substances for use in organic production and establishing their lists. *Official Journal of the European Union* L 253, 13-48.
- Euphresco, 2021a. Euphresco international network. Available from <https://www.euphresco.net/> Accessed on August 2021.
- Euphresco, 2021b. Euphresco Research projects - Portfolio. Available from <https://www.euphresco.net/projects/portfolio> Accessed on August 2021.
- Euphresco, 2021c. Euphresco BasicS project. Available from <https://zenodo.org/record/5113865#.YPWarugzaUk> Accessed on August 2021.
- Euphresco, 2021d. BasicS project. Available from <https://www.researchgate.net/project/EUPHRESCO-Basic-substances-as-an-environmentally-friendly-alternative-to-synthetic-pesticides-for-plant-protection-BasicS> Accessed on August 2021.
- Marchand, P.A., 2015. Basic Substances: An approval opportunity for Low Concern Natural Products under EU pesticide regulation. *Pest Management Science* 71, 1197-1200.
- Marchand, P.A., 2016. Basic substances under EC 1107/2009 phytochemical regulation: experience with non-biocide and food products as biorationals. *Journal of Plant Protection Research* 56, 312-318.
- Marchand, P.A., 2017a. Basic and Low risk Substances under European Union pesticide regulations: A new choice for biorationals portfolio of small and medium-sized enterprises. *Journal of Plant Protection Research* 57, 433-440.
- Marchand, P.A., 2017b. Basic Substances under EU Pesticide Regulation: an opportunity for Organic Production? *Organic Farming* 3, 16-19.
- Marchand, P.A., 2017c. Basic substances as renewable and affordable crop protection products. *Chronicle of Bioresource Management* 1, 065-066.
- Matyjaszczyk, E., 2019. Problems of implementing compulsory integrated pest management. *Pest*

- Management Science 75, 2063–2067.
- Rajestary, R., Landi, L., Romanazzi, G., 2021. Chitosan and postharvest decay of fresh fruit: meta-analysis of disease control and antimicrobial and eliciting activities. *Comprehensive Reviews in Food Science and Food Safety* 20, 563–582.
- Robin, D.C., Marchand, P.A., 2019a. Evolution of Directive (EC) No 128/2009 of the European Parliament and of the Council establishing a framework for Community action to achieve the sustainable use of pesticides. *Journal of Regulatory Science* 7, 1–7.
- Robin, D.C., Marchand, P.A., 2019b. Biocontrol active substances: evolution since the entry in vigour of Reg. 1107/2009. *Pest Management Science* 75, 950–959.
- Robin, D.C., Marchand, P.A., 2019c. Evolution of Regulation (EU) No 540/2011 since its entry into force. *Journal of Regulatory Science* 7, 1–7.
- Romanazzi, G., Nigro, F., Ippolito, A., DiVenere, D., Salerno, M., 2002. Effects of pre- and postharvest chitosan treatments to control storage grey mold of table grapes. *Journal of Food Science* 67, 1862–1867.
- Romanazzi, G., Mlikota Gabler, F., Smilanick, J.L. 2006. Preharvest chitosan and postharvest UV irradiation treatments suppress gray mold of table grapes. *Plant Disease* 90, 445–450.
- Romanazzi, G., Feliziani, E., Santini, M., Landi, L., 2013. Effectiveness of postharvest treatment with chitosan and other resistance inducers in the control of storage decay of strawberry. *Postharvest Biology and Technology* 75, 24–27.
- Romanazzi, G., Feliziani, E., Baños, S.B., Sivakumar, D., 2017. Shelf life extension of fresh fruit and vegetables by chitosan treatment. *Critical Reviews in Food Science and Nutrition* 57, 579–601.